

Appl. No. 10/826,056
Amdt./Reply dated Jan. 17, 2006
Reply to Final Office Action of 10/18/05

Remarks/Arguments

There are no amendments to the specification and drawings herein.

Claims 1-9, 12-21, 24 and 43-57 are pending. Claims 10-11, 22-23 and 25-42 were cancelled, without prejudice, in response to the previous Office Action mailed 05/16/2005. Claims 1-7 and 12 are allowed. Claims 8, 9, 13-21, 24 and 43-57 are rejected. Claims 8, 13, 17, 50, 54 and 55 have been amended herein. Reconsideration is respectfully requested.

The Examiner called the undersigned on Oct. 13, 2005 regarding numerous suggested amendments to the pending claims that the Examiner contended would put the application in condition for allowance. The undersigned requested that the Examiner put details of the numerous amendments being suggested in a written office action to give Applicant a written record and time to consider the amendments. The Examiner provided the present Office Action mailed 10-18-05, but instead of presenting the suggested amendments, such that "it would place the application in condition for allowance", as previously stated by the Examiner in the Oct. 13, 2005 telecon with the undersigned, the Examiner made final the present office action. While it may be the Examiner's prerogative to 'change her mind' regarding allowance of the claims, a courtesy telephone call to let the undersigned know that the Examiner had 'changed her mind' would have been appropriate.

In addition, Applicant submits that the finality of the present Office Action is improper. In particular, the Examiner has not provided specific reasons for rejecting Claims 9 and 56 under 35 U.S.C. 112, second paragraph, or otherwise. *In fact, the Examiner is silent on why Claims 9 and 56 are rejected.* Applicant can not respond to the rejection under 35 U.S.C. 112, second paragraph, of Claims 9 and 56 without further information from the Examiner. Hence, Applicant has been denied procedural due process herein. Procedural due process and 35 U.S.C. §132 of the patent statute require that applicants be adequately notified of the reasons for the rejection of claims so that they can decide how to proceed. *In re Ludtke*, 441 F.2d 660, 662, 169 USPQ 563, 565 (CCPA 1971). As such, not only is the Office Action incomplete, but the *finality of the present Office Action is respectfully improper* and such action should not have been taken.

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In addition, the present Final Office Action is silent on whether the rejections from the 05/16/05 Office Action were overcome by Applicant's Response/Amendment dated Aug. 10, 2005. Applicant assumes from the Examiner's silence that the rejection of Claims 13-24 under 35 U.S.C. 112, second paragraph, from the previous Office Action is withdrawn. Moreover, Applicant likewise assumes that the rejection of Claims 1-6, 8-17 and 19-24 under 35 U.S.C. 102(e) as being anticipated by, or in the alternative, under 35 U.S.C. 103(a) as obvious over Chou et al., U.S. Patent Application No. 2004/0156108 (hereinafter 'Chou et al.') is withdrawn. Similarly, Applicant assumes that the rejection of Claims 7 and 18 under 35 U.S.C. 103(a) as being unpatentable over Chou et al. in view of Schaper, U.S. Application No. 2003/0219992 (hereinafter 'Schaper') is withdrawn.

In the present Final Office Action, Claims 8-9, 13-21, 24 and 43-57 were rejected under 35 U.S.C. 112, second paragraph, as being indefinite. With respect to Claim 8, the Examiner contended that it was not clear how layers of a first material can be alternated with a layer of the vertical structure material in the trench. Applicant traverses this rejection and points out that if you have *layers* of a material A and *a layer* of material B that alternate, a logical interpretation of the layers '*alternating*' as recited in the claim would be 'layer A, layer B, layer A'. Moreover, since the meaning of "a layer" is defined in patent law to mean "one or more" layers, then other logical interpretations that follow are 'layer A, layer B, layer A, layer B', and so on, and 'layer B, layer A, layer B, layer A', and so on, as long as the layers are '*alternating*'. Hence, *there is no ambiguity in this wording of Claim 8, as provided*. Reconsideration and withdrawal of this contention are respectfully requested.

Moreover, the Examiner contended, "'the substrate' (line 8) lacking antecedent basis should be changed to 'the semiconductor substrate' to be consistent with the claimed language to clarify scope of the claim". Applicant points out that antecedent basis is provided to "the substrate" in Claim 8 by the recitation of "a semiconductor substrate" on line 2 of Claim 1, from which Claim 8 is dependent, contrary to the Examiner's contention. *Since there is no other 'substrate' recited in Claims 1 or 8*, that "the substrate" refers back to "the semiconductor substrate" is clear and does not raise ambiguity in either scope or interpretation of the claim. One

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skilled in the art would not wonder if "the substrate" meant the "the semiconductor substrate" *or some other 'substrate' that respectfully, is not even recited*. Therefore, 'antecedent basis' is not lacking in Claim 8, contrary to that contended by the Examiner. However, *for consistency only and to expedite the prosecution of this application, and not for antecedent basis*, Applicant has amended Claim 8 to recite "the semiconductor substrate" on line 8 thereof. This amendment does not change or narrow the scope of Claim 8, as originally written. Withdrawal of this rejection is respectfully requested.

With respect to Claim 9, the Examiner is silent on why Claim 9 is rejected. Moreover, the amendment to Claim 8 suggested by the Examiner does not apply to Claim 9. Therefore, a reason for rejecting of Claim 9 should be provided or the rejection of Claim 9 should be withdrawn. As mentioned above, procedural due process and 35 U.S.C. § 132 of the patent statute require that applicants be adequately notified of the reasons for the rejection of claims so that they can decide how to proceed. *In re Ludtke*, cited *supra*.

With respect to Claim 13, the Examiner contended, "it was not clear that 'a vertical structure of the plurality' is a vertical structure of which plurality – the plurality of (111) vertical lattice planes (lines 2-3) or the plurality of nano-scale spaced vertical structures (line 7)". The Examiner kindly suggested adding "of the nano-scale spaced vertical structures" after "of the plurality" on line 8 of Claim 13 and all of the claims dependent therefrom to clarify claim scope. Further, with respect to Claims 19, 20, 21 and 46-47, which are dependent from Claim 13, the Examiner specifically contended that "the vertical structures" recited therein lacked antecedent basis and contended that Claims 19, 20, 21 and 46-47 should be changed to "the nano-scale spaced vertical structure" to clarify scope of the claim". Applicant respectfully traverses this rejection.

While Applicant appreciates the Examiner's suggestions, Applicant disagrees that the scope of the claims need 'clarification', that antecedent basis is lacking, or that the claims are indefinite. For example, Applicant does not agree that one skilled in the art would question whether "a vertical structure of the plurality" is a vertical structure of "the plurality of nano-scaled spaced vertical structures" instead of some

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other 'plurality'. Moreover, Applicant is concerned that adding such words on line 8 of Claim 13, then adding "nano-scaled spaced" on line 12 and line 14 of Claim 13, to be consistent, and further on line 2 of Claim 19, on line 4 of Claim 20, on line 3 of Claim 21, separately on lines 3 and 4 in Claim 46, and line 2 of Claim 47, as directed by the Examiner, would make the claims unnecessarily wordy and cumbersome to achieve clarification of the claim scope sought by the Examiner. Moreover, such recitation of "nano-scale spaced", as suggested by the Examiner, would be required in four (4) places on lines 2, 3 and 4 in Claim 48 and in two (2) places on lines 3 and 4 of Claim 49, which are ultimately dependent from Claim 13.

Therefore, Applicant has amended Claim 13 to instead delete "a plurality of" with respect to the "(111) vertical lattice planes", such that the only recited 'plurality' in Claim 13 is the "plurality of ... vertical structures". As such, the recitation "of the plurality" can refer only to "plurality of ... vertical structures" and could not be of unclear scope to the skilled artisan. Moreover, Applicant has moved the "nano-scale spaced" feature of the plurality of vertical structures to a later location in the claim. As such, each recitation of "vertical structures" is of clear scope without repeating that such vertical structures are 'nano-scaled spaced' each time the vertical structures are recited. Moreover, such amendment to move the "nano-scale spaced" feature in Claim 13 obviates amending any of the claims dependent from Claim 13 to recite "nano-scale spaced", such as in Claims 19, 20, 21 and 46-49. Reconsideration and withdrawal of the rejection of Claim 13 and dependent Claims 19, 20, 21 and 46-49 are respectfully requested.

The Examiner contended, "claimed language of 'trench sidewalls' should be consistently used in Claim 13 and of dependent claims ...". However, Applicant can find no location in Claim 13 where 'the trench sidewalls' is not consistently used. With respect to Claim 17, which is dependent from Claim 13, Applicant submits that 'the vertical sidewalls of the trench' recited in Claim 17 does not lack antecedent basis, is not confusing, and is not inconsistent with the 'trench sidewalls' recited in Claim 13. However, Applicant has amended line 2 of Claim 17 to delete the term "vertical" such that Claim 17 recites in part, "sidewalls of the trench" in order to expedite the prosecution of the application. This amendment does not change or

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narrow the scope of Claim 17, as originally written. Reconsideration and withdrawal of the rejection of Claim 17 are respectfully requested.

Applicant submits that Claims 14-16, 18, 24 and 43-45, which are also dependent from Claim 13, are not affected in any way by the amendments described above or the Examiner's suggested amendments to Claim 13 and "all of dependent claims depending on claim 13 to clarify scope of claims". Therefore, Claims 14-16, 18, 24 and 43-45 *should not have been 'rejected'* in the final Office Action, *but at most could have been 'objected to'* for being dependent on a rejected base claim. Moreover, no other reason for rejecting Claims 14-16, 18, 24 and 43-45 has been provided by the Examiner. Withdrawal of the rejection with respect to Claims 14-16, 18, 24 and 43-45 is respectfully requested.

With respect to Claim 50, the Examiner contended that "the sidewalls" lacked antecedent basis and should be changed to "the vertical sidewalls" to clarify scope of the claim. Applicant respectfully disagrees that there is a lack of antecedent basis for "the sidewalls" and that the scope of Claim 50 requires any clarification for one skilled in the art. The recitation of "a trench with vertical sidewalls" on line 3 of Claim 50 provided the necessary and clear antecedent basis for "the sidewalls". No other 'sidewalls' are recited in Claim 50 to make the scope unclear. However, Applicant has amended Claim 50 to move the term "vertical" to a later recited location, such that amending Claim 50 in each location that 'the sidewalls' is recited is rendered unnecessary. This amendment does not change or narrow the scope of Claim 50, as originally written. Reconsideration and withdrawal of the rejection of Claim 50 are respectfully requested.

With respect to Claims 51-53, which are dependent from Claim 50, the Examiner contended that "the substrate" should be changed to "the semiconductor substrate"; "each sidewall of the trench" should be changed to "each vertical sidewall of the trench"; "an adjacent vertical structure of the plurality" should be changed to "an adjacent vertical structure of the plurality of the vertical structure"; "a vertical structure of the plurality" should be changed to "a vertical structure of the plurality of vertical structures"; and that "the sidewalls" should be changed to "the vertical

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sidewalls of the trench", all to clarify the scope of the claim. Again, Applicant respectfully traverses this rejection.

Claims 51-53 do not need clarification of scope, contrary to the Examiner's contention. Moreover, none of the Examiner's proffered amendments would 'clarify' the scope of Claims 51-53. A skilled artisan would know that "the substrate material" refers to "a material of the semiconductor substrate" recited on line 6 of Claim 50. Further, a skilled artisan would know that "each sidewall of the trench" referred to "a trench with ... sidewalls" recited on line 3 of Claim 50, since no other element 'sidewalls' is recited in Claim 50-53. Likewise, a skilled artisan would know that "an adjacent vertical structure of the plurality" is referring to "a plurality of vertical structures" recited on line 5 of Claim 50, since the term 'plurality' is not recited with respect to any other element in Claim 50 or Claims 51-53. Similarly, a skilled artisan would know that "the sidewalls" again referred to "a trench with ... sidewalls" on line 3 of Claim 50, since no other element 'sidewalls' is recited.

Notwithstanding the above, Applicant has further amended Claim 50 to move 'semiconductor' in line 2 to a later recited location. Moreover, Applicant has deleted the term 'semiconductor' with respect to the 'substrate' on lines 2, 3 and 5 for consistency, such that amending Claims 51 and 52 to recite 'the semiconductor substrate' is rendered superfluous. This amendment also does not change or narrow the scope of Claim 50, as originally written. Further, Applicant declines to amend Claims 51-53 to add "of the vertical structures" after each recitation of "of the plurality", since it is already clear that "the plurality" *can refer only to* "a plurality of vertical structures" recited on line 5 of Claim 50. Moreover, the amendment described above for Claim 50 obviates the Examiner's suggested amendments with respect to inserting 'vertical' before the term "sidewall" or "sidewalls". There is no justification for inserting 'of the trench' after the term "sidewall" or "sidewalls" in Claims 51 and 53 and therefore, Applicant declines to do so. Reconsideration and withdrawal of the rejection of Claims 50-53 are respectfully requested.

With respect to Claim 54, the Examiner contended that recitation of "the sidewalls" lacks antecedent basis and suggested that each recitation on lines 3 and 5 be changed to "the vertical sidewalls". Applicant disagrees and points out that the

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recitation of "a trench with vertical sidewalls" provided the antecedent basis for "the sidewalls". However, Applicant has amended Claim 54 to move the term "vertical" on line 3 to a later recited location, such that inserting the term "vertical" on lines 3 and 5 is rendered superfluous.

With respect to Claim 55, the Examiner contended that the recitation "one of the first materials" should be changed to "one layer of the first material" to clarify the scope of the claim. Applicant has amended Claim 55 accordingly. This amendment does not change or narrow the scope of Claim 55, as originally written. Moreover, the Examiner contended that recitation of "the sidewall" on lines 4 and 5 should be changed, as contended above for Claim 54. Applicant submits that Applicant's amendment to Claim 54 obviates this suggested amendment by the Examiner.

With respect to Claims 56 and 57, the Examiner is silent on why Claims 56 and 57 are rejected under 35 U.S.C. 112, second paragraph. None of the amendments requested by the Examiner or Applicant's amendments herein to Claims 54 and 55 applies to or necessitates amendment to Claims 56 and 57. Therefore, Applicant is unable to respond to this rejection of Claims 56 and 57 and respectfully submits that Applicant has been denied procedural due process therefor. *In re Ludtke*, cited *supra*. Withdrawal of this rejection of Claims 56 and 57 under 35 U.S.C. 112, second paragraph is respectfully requested.

For the reasons set forth above, Applicant respectfully requests reconsideration and withdrawal of the rejection of Claims 8-9, 13-21, 24 and 43-57 under 35 U.S.C. 112, second paragraph.

Claims 54, 55 and 57 were rejected under 35 U.S.C. 102(e) as being anticipated by or, in the alternative, under 35 U.S.C. 103(a) as obvious over Chou et al., U.S. Pub. No. 2004/0156108 (hereinafter 'Chou et al.'). The Examiner contended that Chou et al. disclose the claimed imprinting apparatus and relied on Figures 13-17 and the accompanying text of Chou et al. to support this rejection. In particular, the Examiner contended that Figure 15, attached to the Final Office Action, illustrates the claimed invention. Applicant respectfully traverses this rejection on the grounds that the Examiner failed to establish either a *prima facie* case of anticipation or a *prima facie* case of obviousness of Claims 54, 55 and 57 with respect to Chou et al.

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In particular, Applicant submits that the Examiner failed to show that Chou et al. disclose, explicitly or implicitly, both of "each element of the claim under consideration" (*W.L. Gore & Associates v. Garlock*, 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983)) and the claimed elements "arranged as in the claim" (*Lindemann Maschinenfabrik GmbH v. American Hoist & Derrick Co.*, 730 F.2d 1452, 221 USPQ 481, 485 (Fed. Cir. 1984)), as required by the Federal Circuit for establishing *prima facie* anticipation under 35 U.S.C. 102.

Moreover, Applicant submits that the Examiner failed to show with respect to the rejected claims each of 1) "some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings"; 2) "a reasonable expectation of success" in modifying or combining the teachings of the references; and 3) that the prior art references "teach or suggest all the claim limitations", as required by the courts for establishing a *prima facie* case of obviousness. MPEP, Section 2142, *Establishing a Prima Facie Case of Obviousness*. Moreover, the Examiner failed to establish that the teaching or suggestion to make the claimed combination or modification and the reasonable expectation of success are both "found in the prior art, and not based on applicant's disclosure". *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir.1991) (*emphasis added*). In other words, the Examiner has not met the court-recognized minimum requirements for establishing and supporting a *prima facie* case of either anticipation or obviousness.

In particular, Chou et al. disclose and illustrate a nano-imprinting apparatus and its fabrication. However, nowhere in Chou et al. is it disclosed or suggested, "alternating layers of a first material and a second material in the trench", as recited in Applicant's Claim 54. Chou et al. illustrate, in Figures 13a-13c, a (110) substrate having a patterned SiO₂ masking layer on the surface of the (110) substrate, which is used in etching trenches in the (110) substrate. The SiO₂ masking layer is removed from the surface of the (110) substrate in Figure 13c after the trenches are formed to yield the nano-imprinting apparatus. Nowhere in Figures 13a-13c and Figure 15 does it illustrate any "alternating layers of a first material and a second material in the trench".

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Instead, it is clear from the Figures 13a-13c and Figure 15 of *Chou et al.* that the vertical extending structures, which the Examiner labeled "layer of second material" in the Figure 15 that the Examiner attached to the Final Office Action (hereinafter 'attached Figure 15'), is actually vertically extending portions of the material of the (110) substrate, since Figures 13a-13c illustrate that it is the (110) substrate that is etched to form the vertical structures. ***No other material(s) that distinguishes from the substrate material is present in Figure 15, as disclosed and illustrated by Chou et al.*** Therefore, as best as Applicant can understand the Examiner's attached Figure 15, there are no "alternating layers" in the trench. There are no 'layer of first material' and 'layer of second material', as contended by the Examiner. ***In fact, what the Examiner appears to be referring to as "layers" is not disclosed, explicitly or implicitly, as such by Chou et al. and further, is not disclosed or suggested as such by Chou et al.*** (i.e., not "found in the prior art", but instead appears to be "based on applicant's disclosure" *In re Vaeck*, cited *supra*).

The structure illustrated in Figures 13a-13c and Figure 15 is the substrate material formed into a series of trenches by etching and as such, no "first material" and "second material" is involved "in the trench", as recited in Applicant's Claim 54. Moreover, one skilled in the art would not look at Figures 13a-13c and 15 and the disclosure by Chou et al. and find "layers" of a "first material" and a "second material" that alternate "in the trench". Claim 54 is clearly based on Applicant's Figure 3E. A bottom 304a of the major trench 304 comprises both a first material layer 322 and a second material layer 324 alternating horizontally in the trench 304 on the trench bottom 304a to create a depth *A* in the minor trenches 312 with relatively planar bottoms 312a.

Since the Examiner has failed to show at least that Chou et al. disclose, explicitly or implicitly, "alternating layers of a first material and a second material in the trench", as recited in Applicant's Claim 54, then the Examiner has failed to show at least that there is "no difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention", as required by the Federal Circuit for *prima facie* anticipation under 35 U.S.C. 102.

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Scripps Clinic & Research Found. V. Genentech Inc., 927 F.2d 1565, 18 USPQ 2d 1001, 1010 (Fed. Cir. 1991).

Moreover, since the Examiner has failed to show at least that Chou et al. disclose or suggest, "alternating layers of a first material and a second material in the trench", as recited in Applicant's Claim 54, then the Examiner at least has failed to show that Chou et al. disclose or suggest "all the claimed limitations" of Claim 54, as required by the Federal Circuit for *prima facie* obviousness under 35 U.S.C. 103. *In re Royka*, 490 F.2d 981, 180 USPQ 580 (CCPA 1974).

Claims 55 and 57 are dependent from and include all of the limitations of base Claim 54. For the reasons set forth above, the Examiner failed to establish that Chou et al. render unpatentable base Claim 54. As such, the Examiner has further failed to show that Chou et al. render unpatentable dependent Claims 55 and 57 for at least the same reasons.

Claim 56 is also dependent from base Claim 54, but was not rejected under 35 U.S.C. 102(e)/103(a) with respect to Chou et al. Instead Claim 56 was included in the rejection under 35 U.S.C. 112, second paragraph, ***but as mentioned above, absolutely no reason for such rejection was given by the Examiner.*** Moreover, none of the amendments suggested by the Examiner for Claim 54 applied to Claim 56. Therefore, the rejection of Claim 56 must be withdrawn.

Applicant appreciates the allowance of Claims 1-7 and 12. For the reasons set forth above, Applicant submits that Claim 9, 14-16, 18, 24, 43-45 and 56 also should have been deemed allowable, since the Examiner failed to identify any reason for the rejection thereof, as written.

In summary, Claims 1-9, 12-21, 24 and 43-57 are pending in the application. Claims 1-7 and 12 were allowed. Claims 8, 9, 13-21, 24 and 43-57 were rejected. Claims 8, 13, 17, 50, 54 and 55 are amended. No reasons for rejecting Claims 9 and 56 were provided by the Examiner, such that the finality of this Office Action is improper. Applicant respectfully submits that Claims 8, 9, 13-21, 24 and 43-57 are in condition for allowance along with allowed Claims 1-7 and 12. It is respectfully

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requested that Claims 8, 9, 13-21, 24 and 43-57 be allowed along with allowed Claims 1-7 and 12, and that the application be passed to issue at an early date.

Should the Examiner have any questions regarding the above, please contact the undersigned, Elizabeth E. Leitereg, telephone number (775) 849-3085, or David W. Collins, Reg. No. 26,857, Attorney for Applicants, Hewlett Packard Company, at telephone number (520) 399-3203.

Respectfully submitted,
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CERTIFICATE OF TRANSMISSION

I hereby certify that this correspondence is being facsimile transmitted to the United States Patent and Trademark Office on the date shown below.

Elizabeth E. Leitereg Jan. 17, 2006
Elizabeth E. Leitereg Date
